

by objects in its path. The returns from the coherent bursts are split into two mutually orthogonal components, i.e., the in-phase (I) and quadrature (Q) components. A target helix, representing noise contamination of the return signal therefore imposed onto a clutter trajectory that is substantially parallel to a time axis. This helical model of the target return is fitted to the data sampled from the returns. The fit to the sampled data is optimized in a least squares fashion to minimize the error value. The best fit target radial velocity is extracted from the helix and outputted.

Independent claim 17 broadly encompasses the features described above in reciting a method extracting a radial velocity characteristic of a target, that comprises among other elements, applying a predetermined function to I-Q returns and modifying the predetermined function to match sample data as a function of velocity.

*The Carrara* patent is directed a device that compensates for the speed of clutter in a coherent Doppler radar system by establishing a phase variation of a pulse burst transmission over a series of periods. This technique uses a moving clutter notch Moving Target Indication (MTI), which is no different from the prior art systems that Applicant discusses in the Background section of the disclosure. More importantly, the system of the *Carrara* patent does not contemplate outputting a target range rate. Rather, *the Carrara patent* discloses using a phase rotation per pulse parameter based on a slow change in phase (i.e., low velocity) to determine clutter range rate. This fact is evident at column 4, line 43, where the *Carrara* patent discloses that the function  $S_{k,i} = Ae^{(2\pi \cdot i \cdot f \cdot d \cdot (t + kT_r))}$  is a received signal in which A represents the clutter return amplitude. Upon close inspection, it becomes reasonably clear that the equation is focused on measuring clutter, as an equation

used to detect a target in the presence of clutter comprises a more complex function and involves the extraction the target amplitude from the signals that include clutter. Applicants respectfully submit that the *Carrara* patent is not related to target detection and is only capable of addressing issues related to clutter, as clutter is always assumed to be much a larger component of the received signal than noise.

The Examiner appears to broadly interpret Applicants claimed targets as being analogous to the clutter disclosed in the *Carrara* patent. However, the *Carrara* patent is concerned with a process where the slow movement of moving clutter is measured in the absence of a target or noise and the resultant bulk phase shift used to adjust the phase of the subsequent returns such that the resultant phase of the returns from the clutter remain constant. In contrast, Applicants claimed embodiment is directed to determining (and reporting) the target range rate, target 'size', target range ambiguity, target azimuthal position, and possibly target tangential velocity.

Applicants' claims and the *Carrara* patent are alike in that that both use coherent 'bursts' of pulses, which are characteristic of MTI or Doppler processing radar. However, this single point of commonality falls far short in establishing a *prima facie* case of anticipation. In fact, because the *Carrara* patent is directed to improving the cancellation of moving clutter in an MTI radar processing chain, one of ordinary skill would be incapable of extracting a radial velocity characteristic of a target from a method that includes determining a target radial velocity as recited in Applicants' claims.

Applicants understand that the claims are given their broadest reasonable interpretation. Even under a review as such, the concept described in the *Carrara*

patent is not reasonably related to the claimed embodiment so that the claims are anticipated.

To properly anticipate a claim, the document must disclose, explicitly or implicitly, each and every feature recited in the claim. See Verdegall Bros. v. Union Oil Co. of Calif., 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The *Carrara* patent fails to disclose, teach, or suggest every element recited in independent claim 17, therefore this claim is not anticipated. Accordingly, Applicants respectfully request that the rejection of claim 17 and its dependent claims be withdrawn.

In an alternative rejection, the Examiner acknowledges that the *Carrara* patent fails to disclose Applicants' claimed applying a predetermined function to I-Q returns, and relies on the *Togashi* patent in an effort to remedy this deficiency.

Like the *Carrara* patent, the *Togashi* patent merely describes a moving notch MTI. Thus, the MTI concept does not encompass a technique for extracting target velocity as recited in Applicants' claims. Both the *Carrara* and *Togashi* patents describe filters that are designed to eliminate the clutter component from the signal data and include techniques that are common in prior art systems.

The Examiner alleges that the *Carrara* patent discloses Applicants' claimed extraction of range ambiguity (column 7 lines 11 to 14). Upon careful review, it appears that the *Carrara* patent is directed to resolving a situation in which clutter often extends over many adjacent range cells. In contrast, Applicants' claim language involves processing a return from one pulse that is received in the 'first time around' interval of a second or subsequent pulse, thereby giving a false 'close in' return when in fact the reflecting object (i.e. target) is distant. Range ambiguous

returns would prevent the approach described in the *Carrara* patent from working properly as these returns would produce ghost targets in MTI and Moving Target Detection (MTD) processing radar systems.

In summary, the *Carrara* and *Togashi* patents when applied individually or in the manner as alleged by the Examiner, fail to disclose or suggest every element recited in Applicants' claims. Moreover, it appears that while both references disclose systems based on the Moving Target Indication technique, these references are not particularly related to extracting a radial velocity characteristic of a target as recited in Applicants' claims. For these reasons, a *prima facie* case of obviousness has not been established.

To establish *prima facie* obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). Moreover, obviousness "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination." ACS Hosp. Sys. V. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). Based on the foregoing discussion, Applicants respectfully request that the rejection of claim 17 and its dependent claims be withdrawn.

Dependent claims 19, 20-26, 28, and 33-35 are distinguishable over the applied references by virtue of the discussion above. These claims, however, are also novel over the applied art because of the additional elements recited therein. The innovative merit of these additional features is discussed in detail below.

Regarding dependent claim 20, the *Togashi* patent (column 6 lines 13-20) does not disclose Applicants' claimed low order polynomial but merely discloses a

trigonometric equation for the clutter return. Being that both the *Togashi* and *Carrara* patents are directed to clutter velocity, the use of a low order polynomial as recited in Applicants' claims would not be obvious since a low order polynomial is incompatible with the described techniques. In other words, modifying either the *Carrara* or *Togashi* patents to include a low order polynomial would destroy the basic principle of operation of each reference and their collective result, since a low order polynomial is not consistent with a low velocity constant rate of change in phase, which is germane to clutter processing systems as such. Accordingly, withdrawal of this rejection is respectfully requested.

Regarding claim 22, the *Carrara* patent fails to disclose a system that extracts range ambiguity from the sampled data. Applicants respectfully submit that because the *Carrara* patent is focused on processing adjacent range cells, one of ordinary skill would not have reason to look to its disclosure for Applicants' claim features because the system described in the *Carrara* patent is incapable of processing ambiguous range returns. For this reason, withdrawal of this rejection is respectfully requested.

Regarding claim 23, the *Carrara* patent does not describe a means of extracting target azimuth as recited in Applicants' claims. As cited by the Examiner, the *Carrara* patent discusses the calculation of a phase angle. This phase angle, however, is associated with the relative phase of the returned signal. In contrast, Applicants' claimed target azimuth is determined from the azimuthal direction of the antenna or transmitted signal with reference to some directional datum (usually geographic North). Therefore, a *prima facie* case of obviousness has not been established and withdrawal of this rejection is respectfully requested.

Regarding claim 28, neither the *Carrara* nor *Togashi* patents cover determining target velocity. Thus, one of ordinary skill would have no rational reason to look to or modify either reference to obtain a **target** velocity as recited in Applicants' claims. In fact the approaches described in the references, are mutually incompatible such that one of ordinary skill starting with the techniques described in the *Carrara* patent would not look to the *Togashi* patent, or visa versa. Thus, withdrawal of this rejection is respectfully requested.

The Office is reminded that the Office has the initial burden of establishing a **factual basis** to support the legal conclusion of obviousness. In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). For rejections under 35 U.S.C. § 103(a) based upon a combination of prior art elements, in KSR Int'l v. Teleflex Inc., 127 S.Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007), the Supreme Court stated that "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." "Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some **articulated reasoning with some rational underpinning** to support the legal conclusion of obviousness." In re Kahn, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006) (emphasis added). For at least the above reasons, Applicants respectfully request that the rejection of claims 17, 19, 20-26, 28, and 33-35 under 35 U.S.C. §103 be withdrawn, and these claims be allowed.

In numbered paragraph 3 on page 6 of the Office Action, claim 18 stands rejected under 35 U.S.C. §103(a) for alleged unpatentability over the *Carrara* patent

in view of *Borth* (U.S. Patent No. 4,887,050). Applicants respectfully traverse this rejection.

The concepts described in the *Carrara* and *Borth* patents are not reasonably related such that one of ordinary skill would combine their results to achieve the claimed results. For example, the "Carrara" patent discloses a least squares approach, in so far as a simple average is a least squares solution to the value of a fixed term in the presence of errors. The term that the Carrara patent is extracting is the constant phase velocity between successive returns. In contrast, the Borth patent uses least squares fitting to determine frequency from sampled phase returns, but does so in a completely different context and for a different signal structure than the *Carrara* patent. Because the *Carrara* patent is not concerned with the measurement of **target** range rate, one of ordinary skill would not have a rational basis to modify its technique to include a more complicated least squares method as described in the *Borth* patent. As a result, withdrawal of this rejection is respectfully requested.

In numbered paragraph 4 bridging pages 6 and 7 of the Office Action, claims 27 and 36 are rejected under 35 U.S.C. §103(a) as unpatentable over the *Carrara* patent in view of *Okurowski* (U.S. Patent No. 5,225,839). Applicants respectfully traverse this rejection. Because these claims depend from claim 17, Applicants respectfully submit that they are allowable for at least the same reasons discussed above. Withdrawal of these rejections is therefore, respectfully requested.

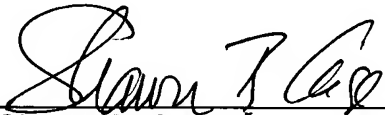
Based on at least the foregoing amendments and remarks, Applicants submit that claims 17-28 and 33-36 are allowable, and this application is in condition for allowance. Accordingly, Applicants request a favorable examination and consideration of the instant application. In the event the instant application can be placed in even better form, Applicants request that the undersigned attorney be contacted at the number below.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: February 19, 2008

By:

A handwritten signature in black ink, appearing to read "Shawn B. Cage", is written over a horizontal line.

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